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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/534,585	05/11/2005	Kang-Ho Ahn	4684-023	4442

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EXAMINER	
TAI, XIUYU	

ART UNIT	PAPER NUMBER
1795	

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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	10/534,585	AHN ET AL.	
	Examiner	Art Unit	
	Xiuyu Tai	1795	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE *3* MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *11 May 2005*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-19* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-19* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *11 May 2005* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date *6/19/2007*.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

Claim Rejections - 35 USC § 103

1. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

2. The factual inquiries set forth in *Graham* **v.** *John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

3. This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

4. Claim 1-3, 5-14, and 16-19 are rejected under 35 U.S.C. 103(a) as being unpatentable over Ahn et al (WO 01/83101) in view of Pratsinis et al (U.S. 5,861,132).

Regarding claims 1 and 14, Ahn et al disclose an apparatus for manufacturing ultra-fine particles. The apparatus comprises: (1) guide duct 20 (Figure 1; page 4 line18); (2) a gas injection means 51 supplying gas through throughhole 31 (Figure 2; page 6, line 5-11); (3) a fuel gas injection means 55 through throughhole 35 (Figure 2; page 6, line 5-14); (4) a high voltage applied from a power supply 40 to generate voltage different (Figure 1; page 4, line 26); (5) a heater 60 which is disposed on an outer surface of the guide duct (Figure 1; page 5, line 10); and (6) a collecting plate 70 disposed to be spaced apart form outlet of the guide duct (Figure 1; page 5, line 15).

5. Ahn et al fail to teach a discharging means to generate ions through electric discharge from a discharge electrode. However, Pratsinis et al disclose a process for making ceramic particles using a corona discharge electric field. The reference of Pratsinis states that small particle size product may be produced by applying an electric field to ionize reactants before in the production of silicon dioxide (col. 3, line 15-18), and further teaches that a corona discharge electric field is utilized in the reaction area by using electrodes in the form of needles (col. 8, line 23-32) to produce particles having high surface area, high anatase content , and high purity (col. 7, line 65 & col. 8, line 1-5). Therefore, it would be obvious for one having ordinary skill in the art to utilize a corona discharge electric field as taught by Pratsinis in lieu of the electrospry capillary 10 of Ahn in order to produce particles having high surface area, high anatase content , and high purity using a corona discharge electric field. As a result, the power supply is connected between the corona discharge electrode and the guide duct of Ahn/Pratsinis.

6. Regarding claim 2, the apparatus of Ahn also includes a supporting member 30 fitted into the guide duct 20 (Figure 1; page 4, line 19) and the supporting member 30 having a throughhole 32 (Figure 1; page 4, line 21-22), reads on the instant claim.

7. Regarding claim 3, Ahn also teaches a gas injection means 52 through the throughhole 32 (Figure 1; page 4, line 24), reads on the instant claim .

8. Regarding claim 5, the apparatus of Ahn further comprises a cooler 80 (Figure 1; page 5, line 19), reads on the instant claim.

9. Regarding claim 6, Ahn also disclose a plurality of mutually connected guide ducts 25 insulated by insulating material 27 (Figure 3; page 6, line 26-29; claim 4), reads on the instant claim.

10. Regarding claim 7, the needle electrode of Pratsinis is made of an electrically conductive material having a diameter about 50-100 um (col. 8, line 30-33) that is a wire electrode, reads on the instant claim.

11. Regarding claim 8, the high voltage is applied from a power supply 40, a first variable resistor 42, and a second variable resistor 44 (Figure 1; page 4, line 26-30), reads on the instant claim.

12. Regarding claim 9, Ahn et al disclose an apparatus for manufacturing ultra-fine particles. The apparatus comprises: (1) first guide duct 21 (Figure 2; page 5, line 27); (2) a second guide duct 23 disposed coaxially with the first guide duct 21 (Figure 2; page 6, line 3); a third guide duct 25 disposed coaxially with the first guide duct 21 (Figure 2; page 6. line 4); (4) a carrier gas injection means 51 supplying carrier gas to the first guide duct 21 (Figure 2; page 6, line 10-11); (5) a gas injection means 53 for

supplying reaction gas into the second guide duct 23 (Figure 2; page 6, line 13-14); (6) a fuel gas injection means 55 for supplying fuel gas into the third guide duct 25 (Figure 2; page 6, line 14-15); (7) a high voltage applied from a power supply 40 to generate voltage different (Figure 1; page 4, line 26); (8) a heater 60 which is disposed on an outer surface of the guide duct (Figure 1; page 5, line 10); and (9) a collecting plate 70 disposed to be spaced apart form outlet of the guide duct (Figure 1; page 5, line 15). It should be noted that sheath gas injection means 53 is fully capable of delivering reaction gas.

13. Ahn et al fail to teach a discharging means to generate ions through electric discharge from a discharge electrode. However, Pratsinis et al disclose a process for making ceramic particles using a corona discharge electric field. The reference of Pratsinis states that small particle size product may be produced by applying an electric field to ionize reactants before in the production of silicon dioxide (col. 3, line 15-18), and further teaches that a corona discharge electric field is utilized in the reaction area by using electrodes in the form of needles (col. 8, line 23-32) to produce particles having high surface area, high anatase content , and high purity (col. 7, line 65 & col. 8, line 1-5). Therefore, it would be obvious for one having ordinary skill in the art to utilize a corona discharge electric field as taught by Pratsinis in lieu of the electrospry capillary 10 of Ahn in order to produce particles having high surface area, high anatase content , and high purity using a corona discharge electric field. As a result, the power supply is connected between the corona discharge electrode and the guide duct of Ahn/Pratsinis.

14. Regarding claim 10, the supporting member 30 of Ahn is fitted into the first, second , and third guide duct through throughholes 31, 33, and 35 (Figure 2; page 6, line 7-10), reads on the instant claim.

15. Regarding claim 11, the apparatus of Ahn further comprises a cooler 80 (Figure 2; page 6, line 22), reads on the instant claim.

16. Regarding claim 12, Ahn et al fail to teach a fourth guide duct for supplying sheath gas. However, Pratsinis et al disclose a process for making ceramic particles using a corona discharge electric field. The reactor of Pratsinis comprises five concentric quarts tubes (col. 4, line 40-41), and further states that the number of concentric tubes in the reactor and their size can be varied depending upon the requirement of the particular reaction (col. 4, line 42-44). Ahn also teaches a sheath gas for preventing heat of flames from being transferred to the first guide duct 21 when the flames occur at the end of the third guide duct 25 (page 6, line 15-17). Therefore, it would be obvious for one having ordinary skill in the art to include a fourth guide duct as suggested by Pratsinis for introducing a sheath gas in order to prevent heat of flames from being transferred to the first guide duct 21 of Ahn.

17. Regarding claim 13, the high voltage is applied from a power supply 40, a first variable resistor 42, and a second variable resistor 44 (Figure 2; page 5, line 26-30), reads on the instant claim.

18. Claims 16-19 are rejected under 35 U.S.C. 103(a) as being unpatentable over Ahn et al (WO 01/83101) in view of Pratsinis et al (U.S. 5,861,132).

19. Regarding claim 16, Ahn et al disclose an apparatus for manufacturing ultra-fine particles. The apparatus comprises: (1) guide duct 20 (Figure 1; page 4 line18); (2) a gas injection means 51 supplying gas through throughhole 31 (Figure 2; page 6, line 5-11); (3) a fuel gas injection means 55 through throughhole 35 (Figure 2; page 6, line 5-14); (4) a high voltage applied from a power supply 40 to generate voltage different (Figure 1; page 4, line 26); (5) a heater 60 which is disposed on an outer surface of the guide duct (Figure 1; page 5, line 10); and (6) a collecting plate 70 disposed to be spaced apart form outlet of the guide duct (Figure 1; page 5, line 15).

20. Ahn et al fail to teach a discharging means to generate ions through electric discharge from a discharge electrode. However, Pratsinis et al disclose a process for making ceramic particles using a corona discharge electric field. The reference of Pratsinis states that small particle size product may be produced by applying an electric field to ionize reactants before in the production of silicon dioxide (col. 3, line 15-18), and further teaches that a corona discharge electric field is utilized in the reaction area by using electrodes in the form of needles (col. 8, line 23-32) to produce particles having high surface area, high anatase content , and high purity (col. 7, line 65 & col. 8, line 1-5). Therefore, it would be obvious for one having ordinary skill in the art to utilize a corona discharge electric field as taught by Pratsinis in lieu of the electrospry capillary 10 of Ahn in order to produce particles having high surface area, high anatase content , and high purity using a corona discharge electric field. As a result, the power supply is connected between the corona discharge electrode and the guide duct of Ahn/Pratsinis.

21. In order to utilize corona discharge to produce small size particles, a needle electrode as a corona discharge electrode is replaced with the electrospray capillary 10 of Ahn's apparatus and the needle electrode is connected with the power source 40. As a result, the apparatus of Ahn/Pratsinis comprises (1) a guide duct 20, (2) a needle electrode as a corona discharge electrode replaced with the electrospray capillary 10 that is disposed within the guide duct f (page 4, line 9-10); (3) a power source 40 supplied to the electrode and the guide duct for generating ions (page 4, line 26-27); (4) throughholes 31, 33, and 35 provided for supplying reaction gases, reaction control gas, and fuel into the guide duct (page 6, line 8-15); (6) a heater 60 provided for heating the guide duct 20 and for supplying energy to the reaction gases (page 5, line 10-11); and (7) a collecting plate for collecting produced particles (page 5, line 15-16). The combined teaching of Ahn/Pratsinis teaches the method as cited in the instant claim.

22. Regarding claim 17, the outer surface of the guide duct is heated externally by a heater 60 (page 5, line 10-11), reads on the instant claim.

23. Regarding claim 18, fuel gas is injected into the guide duct via the fuel injection means 55 to ignite flume reaction (page 6, line 14-17), reads on the instant claim.

24. Regarding claim 19, a cooler 80 is provided for cooling the collecting plate 70 (page 4, line 18-20), reads on the instant claim.

25. Claim 4 is rejected under 35 U.S.C. 103(a) as being unpatentable over Ahn et al (WO 01/83101) and Pratsinis et al (U.S. 5,861,132) as applied to claim 3 above, and further in view of Carnahan et al (U.S. 5,420,424).

26. Regarding claim 4, Ahn/Pratsinis fail to teach a guide electrode surrounding the discharge electrode. However, Carnahan et al disclose an ion mobility spectrometer using a corona discharge. The ionizer comprises a corona wire 60 (via electrode 32) and a shield electrode 64 (Figure 2; col. 6, line 12-28). The reference of Carnahan teaches that the shield electrode 64 is introduced between the electrode 22 and 32 and electrodes 32/64 are maintained at the same potential to enhance ion generation on the tip of the corona wire 60 (col. 7, line 20-25). Therefore, it would be obvious for one having ordinary skill in the art to include a shield electrode as suggested by Carnahan in order to enhance ion generation, hence promoting particle production in the apparatus of Ahn/Pratsinis..

27. Claim 15 is rejected under 35 U.S.C. 103(a) as being unpatentable over Ahn et al (WO 01/83101) and Pratsinis et al (U.S. 5,861,132) as applied to claim 14 above, and further in view of Carnahan et al (U.S. 5,420,424).

28. Regarding claim 15, Ahn/Pratsinis fail to teach a guide electrode surrounding the discharge electrode. However, Carnahan et al disclose an ion mobility spectrometer using a corona discharge. The ionizer comprises a corona wire 60 (via electrode 32) and a shield electrode 64 (Figure 2; col. 6, line 12-28). The reference of Carnahan teaches that the shield electrode 64 is introduced between the electrode 22 and 32 and electrodes 32/64 are maintained at the same potential to enhance ion generation on the tip of the corona wire 60 (col. 7, line 20-25). Therefore, it would be obvious for one having ordinary skill in the art to include a shield electrode as suggested by Carnahan in

order to enhance ion generation, hence promoting particle production in the apparatus of Ahn/Pratsinis.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Xiuyu Tai whose telephone number is 571-270-1855. The examiner can normally be reached on Monday - Friday, 7:30 AM - 5:00 PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Alexa Neckel can be reached on 571-272-1446. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/X. T./
Examiner, Art Unit 1795
/Alexa D. Neckel/
Supervisory Patent Examiner, Art Unit 1795